

The Examiner is respectfully requested to amend the above-identified application as follows.

IN THE CLAIMS:

Please amend Claims 25, 32, 37 and 44 and add Claims 49-52 as follows. A marked-up copy of Claims 25, 32, 37 and 44 showing the changes made thereto, is attached. Note that all the claims currently pending in this application, including those not presently amended, have been reproduced below for the Examiner's convenience.

25. (Amended) An exposure apparatus for performing exposure using X-rays in a vacuum comprising:

a projection optical system which projects a pattern of a first object onto a second object by using the X-rays, said projection optical system including a diaphragm arranged in the vacuum, and a cooling device which cools said diaphragm.

26. (Unamended) An apparatus according to Claim 25, wherein said diaphragm has an opening in its center, said diaphragm setting a numerical aperture of said projection optical system by adjusting the opening, and

said cooling device being located between the opening and an outer edge of said diaphragm.

27. (Unamended) An apparatus according to Claim 25, wherein said cooling device comprises a fluid circulation system, which is provided with said diaphragm, in which a temperature controlled fluid circulates.

28. (Unamended) An apparatus according to Claim 27, wherein said cooling device controls the temperature of said diaphragm to be almost the same as that of said projection optical system, during the exposure operation.

29. (Unamended) An apparatus according to Claim 28, further comprising a constant temperature system for said projection optical system, said constant temperature system providing the temperature controlled fluid to said cooling device.

30. (Unamended) An apparatus according to Claim 25, wherein said mechanism comprises a Peltier element.

31. (Unamended) An apparatus according to Claim 25, further comprising a sensor which detects temperature information of said diaphragm and produces an output, wherein the temperature of said cooling device is controlled based on the sensor output.

32. (Amended) An apparatus according to Claim 31, wherein said sensor is located at a position not being irradiated with the X-rays.

33. (Unamended) An apparatus according to Claim 32, wherein said sensor is provided on said diaphragm, on a side facing the second object.

34. (Unamended) An apparatus according to Claim 25, wherein said diaphragm comprises an iris diaphragm.

35. (Unamended) An apparatus according to Claim 25, wherein said diaphragm comprises a turret having a plurality of openings.

36. (Unamended) An apparatus according to Claim 25, further comprising a reticle stage for holding a reticle as the first object, a wafer stage for holding a wafer as the second object, and an illumination optical system which illuminates the reticle.

37. (Amended) A device manufacturing method comprising the steps of:
performing exposure of a pattern of a reticle onto a wafer by projecting X-rays through a projection optical system that includes a diaphragm arranged in a vacuum;

cooling the diaphragm arranged in the vacuum; and
manufacturing a device from the wafer.

38. (Unamended) A method according to Claim 37, further comprising setting, using the diaphragm, a numerical aperture of the projection optical system by adjusting an opening centered in the diaphragm,

wherein the cooling device is located between the adjustable opening and an outer edge of the diaphragm.

39. (Unamended) A method according to Claim 37, wherein said cooling device cools the diaphragm by circulating a fluid proximate to the diaphragm.

40. (Unamended) A method according to Claim 39, wherein the temperature of the diaphragm is kept to be almost the same as that of the projection optical system, during the exposure operation.

41. (Unamended) A method according to Claim 40, further comprising controlling temperature of the projection optical system as well as that of the diaphragm.

42. (Unamended) A method according to Claim 37, wherein said cooling device cools the diaphragm by using a Peltier element.

43. (Unamended) A method according to Claim 37, further comprising detecting temperature information of the diaphragm with a sensor, and controlling the temperature of the diaphragm based an output of the sensor.

44. (Amended) A method according to Claim 43, further comprising providing the sensor at a location not being irradiated with the X-rays.

45. (Unamended) A method according to Claim 44, further comprising providing the sensor on the diaphragm on a side facing the wafer.

46. (Unamended) A method according to Claim 37, wherein the diaphragm comprises an iris diaphragm.

47. (Unamended) A method according to Claim 37, wherein the diaphragm comprises a turret having a plurality of openings.

48. (Unamended) A method according to Claim 37, wherein said manufacturing step comprises a resist process and a development process.

--49. (New) An exposure apparatus for performing exposure using EUV in a vacuum comprising:

a projection optical system which projects a pattern of a first object onto a second object by using the EUV, said projection optical system including a diaphragm arranged in the vacuum, and a cooling device which cools said diaphragm through a heat removal path joined to the diaphragm.

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contd

50. (New) A device manufacturing method comprising the steps of:
performing exposure of a pattern of a reticle onto a wafer by projecting EUV through a projection optical system that includes a diaphragm arranged in a vacuum;
cooling the diaphragm arranged in the vacuum through a cooling device having a heat removal path joined to the diaphragm; and
manufacturing a device from the wafer.

51. (New) An exposure apparatus for performing exposure using EUV in a vacuum comprising:

a projection optical system which projects a pattern of a first object onto a second object using the EUV, said projection optical system including a diaphragm arranged in the vacuum, and a cooling device which cools said diaphragm; and

a sensor which detects temperature information of said diaphragm, said sensor is located at a position not being irradiated with the EUV.

52. (New) A device manufacturing method comprising the steps of: